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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,824	12/20/2001	Joseph Paul Lauer	41933/NJP/E264	2585

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EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	**PAPER NUMBER**
2631	

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	10/027,824	LAUER, JOSEPH PAUL
	Examiner	Art Unit
	Emmanuel Bayard	2631

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ~~12/20/01~~. 6/16/03

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim et al U.S. patent No 5,508,752.

As per claims 1, 9 Kim et al teaches method for Viterbi decoding comprising: receiving a sampled signal (see figs. 4 and 11 element 27 and col.3, line 18 and col.4, line 47); making a hard decision on which constellation point the sampled signal represents thereby creating a hard decision Point (see fig.11 element 60 and col.10, lines 41, 47-50); determining a distance mapper is functionally equivalent to the claimed (a scaling factor (k)) (Note that it is well known in the art that a mapper is generally defined by a scalar difference or mapping is achieved by determining a scaling function. Therefore the scaling factor is the same as the distance mapper) (see fig.11 element 61 and col.10, lines 42-47) corresponding to the hard decision point; and providing the distance mapper (scaling factor) (k) and the hard decision to a Viterbi decoder (see fig.11 element 62).

As per claim 2, Kim et al teach wherein making a hard decision on which constellation point the sampled signal represents comprises choosing a

constellation point which is the closest Euclidean distance (see col.6, lines 55-65) to the received sample signal.

As per claims 3, 7 Kim et al teach wherein determining a scaling factor (k) corresponding to the hard decision comprises: selecting (see fig.10 element 48 and col.10, lines 10-13) a first constellation point corresponding to the hard decision point (see fig.10 element 46 and col.10, lines 32-39); determining a second constellation point corresponding to a nearest (see col.6, lines 55-65 and col.8, lines 19-30) constellation point having the designated received bit; and assigning a distance mapper (scaling factor) (see fig.11 element 61 and col.10, lines 42-47) value dependent on the number of constellation points between the first constellation point and the second constellation point.

As per claim 4, Kim et al teach wherein comparing the designated received bit to the hard decision to compute the scaling factor comprises reading the scaling factor from a look up table (see fig.12 element 66 and col.10, line 67 to col.11, line1).

As per claim 5, Kim et al teach wherein reading the scaling factor from a look up table further comprises: using the designated received bit and the hard decision to index into a look up table; and reading the scaling factor from the look up table (see fig.12 element 66 and col.10, line 67 to col.11, line1).

As per claim 6, Kim et al teach wherein comparing the designated received bit to the hard decision to compute the scaling factor comprises: selecting a transition for which the scaling factor will be determined, thereby determining a selected transition (see col.8, lines 33-55 a; determining (see

col.11, lines 35-36) a designated received bit that will result in the selected transition; and comparing (see col.9,lines 25-27, 38-43 and col.11, lines 10-14) the designated received bit to the hard decision to compute the scaling factor.

As per claims 8, 10, Kim et al teach wherein determining a scaling factor (k) corresponding to the hard decision point further comprises: determining a first scaling factor (see col.11, lines 19-20) dependent on the location information of the hard decision; determining a second scaling factor (see col.11, lines 19-20) dependent on the signal to noise ratio of the channel; and adding is the same as the claimed (combining) (see col.11, lines 23-25 and col.16, lines 10-11) the first scaling factor with the second scaling factor to
produce the scaling factor k.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 11 is rejected under 35 U.S.C. 102(e) as being anticipated by Hart . over Hart U.S. patent No 6,792,055 .

A method of signal decoding comprising: accepting a received signal (see fig.5 and abstract); quantizing (see figs 3-5 elements 130-132 and col.5, line 39

and col.6, lines 23-29 and col.7, lines 8-12) the received signal to a point in a signal constellation plane, to provide a quantized point; making a hard decision (see fig.5 element 210 and col.7, line 17) as to which constellation point the quantized point represents; determining scaling factors (k's) (see fig.5 elements 240 and col.7, lines 41-45) associated with each constellation point; using the scaling factors and hard decision point to determine soft decision outputs is the same as the claimed (decoder metrics) (see fig.5 elements 230's and col.1, lines 59-60 and col.4,lines 13-30 and col.7, lines 35-50); and providing a decoder metrics and quantized point to a Viterbi decoder (see fig.5 element 140 and col.4, line 13).

As per claim 15, Hart teaches an error detection or error correction decoder (see abstract). Therefore the step of determining the scaling factors associated with each quantized point comprises: determining an amount of noise necessary to create an error in a candidate bit; and assigning the scaling factor in proportion to the amount of noise necessary to create an error in a candidate bit is inherently taught by Hart..

As per claim 16, Hart teaches measuring noise levels (see col.7,lines 61-63). Therefore the step of multiplying the scaling factors times a signal to noise ratio (SNR) scaling factor to provide a scaled SNR result; and using the scaled SNR result to determine the decoder metrics is inherently taught by Hart.

As per claim 17, Hart inherently teaches wherein using the scaled SNR result to determine the decoder metrics comprises: using the results as an index into a branch metric table; and reading the metric associated with the index.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 12-14 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hart U.S. Patent no 6,792,055 B1 in view of Kim et al U.S. Patent No 5,508,752.

As per claim 12, Hart teaches all the features of the claimed invention except determining which constellation point is closest to the quantized point and assigning a value of the nearest constellation point to the quantized point.

Kim et al teaches determining which constellation point is closest to the quantized point and assigning a value of the nearest constellation point to the quantized point (see col.6, lines 55-65 and col.8,lines 19-30).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Kim into Hart as to accurately calculate the magnitude of the Euclidean distances for each transition as taught by Kim (see col.8, lines 19-30).

As per claim 13, Kim and Hart in combination would teach wherein determining which constellation point is closest to the quantized point comprises: computing a Euclidean distance squared between the quantized point and the candidate constellation point; and selecting the constellation point with the smallest Euclidean distance squared as the closest constellation point as to

accurately calculate the magnitude of the Euclidean distances for each transition as taught by Kim (see col.8, line 19-30).

As per claim 15, Hart and Kim in combination would teach wherein selecting the constellation point with a smallest Euclidean distance squared comprises: (a) squaring an X direction distance between the quantized point and the candidate constellation point to provide a squared X direction distance; (b) squaring a Y direction distance between the quantized point and the candidate constellation point to provide a squared Y direction distance; (c) adding the squared X direction distance to the squared Y direction distance to find a Euclidean distance squared; (d) repeating steps a, b and c for all candidate points; (e) selecting the candidate point with a smallest Euclidean distance squared as to accurately calculate the magnitude of the Euclidean distances for each transition as taught by Kim (see col.8, line 19-30).

As per claim 18, Hart teaches an input for accepting a received signal (see fig.5 and abstract); a quantizer that accepts the received signal from the input and quantizes the input to a point in a signal constellation plane, to provide a quantized point (see figs 3-5 elements 130-132 and col.5, line 39 and col.6, lines 23-29 and col.7, lines 8-12); a hard decision unit(see fig.5 element 210 and col.7, line 17) that accepts the quantized point and determines a constellation point that the quantized point represents; a scaling factor unit that determines scaling factors associated with the constellation point (see fig.5 elements 240 and col.7, lines 41-45).

However Hart does not teach a metric calculator that accepts the scaling factors and the constellation points and determines branch metrics for the constellation points.

Kim et al teaches matrix calculator is functionally equivalent to the claimed (metric calculator) (see fig.12 element 63 and col.10, lines 55-67 and col.11, lines 21-25) that accepts the scaling factors and the constellation points and determines branch metrics for the constellation points.

It would have been obvious to one of ordinary skill in the art to implement the teaching of Kim into Hart as to obtain the difference between the Euclidean distances and the branches of the respective states as taught by Kim (see col.10, lines 55-67).

As per claim 19, Hart teaches a Viterbi decoder (see element 140 and col.4, line 3) that accepts the constellation points and the branch metrics and produces decoded bits.

As per claim 20, Hart and Kim in combination would teach wherein the metric calculator comprises: an input that accepts a signal to noise ratio (SNR); an input that accepts scaling factors; and a combination circuit that combines the scaling factors and SNR to create a branch metric as to obtain the difference between the Euclidean distances and the branches of the respective states as taught by Kim (see col.10, lines 55-67).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tran U.S. Patent No 6,463,031 B1 teaches a rate determination technique.

Lim U.S. Patent No 5,654,986 teaches a method and apparatus for decoding trellis coded.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Bayard
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Art Unit 2631

3/25/05

EMMANUEL BAYARD
PRIMARY EXAMINER